Math 499 Syllabus, Fall 2018

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Course Information: Meets on Fridays 12:00 - 12:50 in HBH 453. Office Hours are by appointment only.

Course Description & Aims

This class is an undergraduate research seminar intended to give you some hands-on experience of how modern mathematical research is done, specifically in the area of number theory. This semester we will be studying a problem which combines number theory and combinatorics and is in a relatively new field of mathematics called tropical geometry. The course will begin with lectures on the basic objects and problems we'll be studying. Once you have a good feel for the tools we'll be using, you will start working on your own projects, with our guidance.

Assignments

Lectures will be accompanied by homework problems, which you are encouraged to think about, but do not need to write up. As we get further into the semester, you may be asked to present material that you've been working on. There will be no exams, however a 2 page write-up on what you've worked on will be due at the end of the semester.

Attendance

Attendance is crucial for this class, as it only meets once per week and forms the basis for the majority of your grade. Please do not sign up for this course unless you are confident you will be able to attend class regularly.

Expectations and Grading Policy

Your grade will be determined by active participation and attendance.

The primary objectives of this course are as follows:

1) Starting your own research: Research mathematics often looks quite different from other (undergraduate) mathematics you might have seen up to this point. In particular, one might choose a project in which not only is the answer unknown, but even the path or tools involved in the process of finding the answer is unclear. Sometimes even the question itself isn't clear from the start! In this course, under the guidance of the instructors, students will explore and make observations, formulate conjectures, and attempt to prove these conjectures. Students should not get discouraged if a conjecture is false or if an idea for a proof does not succeed. Research takes time and patience, and each "wrong" idea gives new insight into a problem. You may want to read the following article for some techniques:

- One Introduction to Mathematical Research:
  `http://www.math.uiuc.edu/~reznick/mhoriz.pdf`

2) Reading mathematics critically: How you do this will vary slightly depending on your particular learning style, but there are certain guidelines you should try to follow to start with. Ultimately, the goal is to become an active rather than a passive reader. For example, you will be expected to generate your own questions as you read. This can seem daunting at first, but once you learn the right process to follow, it will start to become natural. For some techniques and general advice, see the following articles:

- How to Read Mathematics:

  `http://web.stonehill.edu/compsci/history_math/math-read.htm`

- A Few Mathematical Skills: Reading Theorems and Reading Definitions:

  `http://www.maa.org/node/121566`